AGENDA

- Welcome/Introductions/Course Overview – Andrew Seeton 8:30-8:45 (15 mins)
- Emergency Management and Disaster Staging Areas – Daniel Stevens & Pat Ryan 8:45 - 9:45 (60 mins)
- Post-Earthquake Inspections – Steven Bibby 9:45-10:15 (30 mins)
- Coffee Break 10:15 - 10:30 (15 mins)
- Detailed Inspections – Doug Smith 10:30 - 11:15 (45 mins)
- Next Steps – Peter Mitchel and Panel 11:45 - 12:00 (15 mins)
- Q&A – Whole Panel 12:00 - 12:30 (30 mins)
- Box Lunch pick-up and walk to Nelson Park 12:30 - 1:00
- Field Trip – Nelson Park DSA Container - Daniel Stevens 12:30 - 1:30

PANEL

- Andrew Seeton P.Eng., MASc Senior Structural Engineer
  Glotman Simpson Consulting Engineers
- Daniel Stevens Director of Emergency Management
  City of Vancouver
- Steven Bibby Senior Manager, Security and Emergency Services | BC Housing
- Doug Smith P.Eng Assistant Director
  Sustainability Group | City of Vancouver
- Pat Ryan P.Eng., M.Sc., Deputy Chief Building Official
  Assistant Director Development Services
  City of Vancouver
- Peter R. Mitchell P.Eng. Director, Professional Practice, Standards & Development | APEG
SEABC Post-Earthquake Committee

Participants:

- SEABC
- APEGBC
- Emergency Management BC
- BC Housing
- UBC
- City of Vancouver
- City of Victoria
- Other Municipalities/Districts
- EERI BC Chapter

Purpose: Assist in developing and implementing a plan for post-earthquake assessment of structures following a major earthquake affecting the Lower Mainland and/or Victoria area. SEABC members (structural engineers) can contribute as a key resource if prepared. How best to integrate a coordinated structural assessment plan with the various emergency response plans already in place?

Deliverables: Following a review of the applicable emergency response plans, formulate a simple, effective plan for post-earthquake assessment of structures, the key aspects of which can be summarized in a 2 page document to share with SEABC members and appropriate emergency response agencies. SEABC to update this document periodically and maintain roster of structural engineers recently trained/re-trained in assessment procedures. SEABC to offer ongoing training/update seminars.
As structural engineers, we have an opportunity to make a significant contribution to the disaster resilience of the province of BC.

By drawing on lessons from earthquakes in other areas and proactively formulating a simple plan that is integrated with existing emergency plans at municipal, provincial, and federal levels, we can enhance the post-earthquake response and recovery phases of our region when the earthquake happens.


- Nov 2014: Overview seminar and field trip to COV Disaster Staging Area

- 2015, 2016, 2017...
SEABC Post-Earthquake Committee

Aim is to find consensus on following questions:

1. When to go? What triggers mobilization?
2. Where to go?
3. Who to report to? Who will manage volunteer engineers?
4. What damage assessment procedures to follow?
5. What buildings/structures to assess? How to prioritize?
6. Will this be paid work or volunteer? How much to volunteer?
7. How to reconcile general assistance vs. servicing clients?
8. What are the legal issues?

Emergency Management and Disaster Staging Areas
Emergency Response and Disaster Staging Areas

- Big Picture
- City Plans
- Role Of Engineers
- BCERMS
- DSA’s

Emergency Experience - Vancouver

- Recognized significance & learning potential of many events
- Staff sent to various events to assist and/or learn
- Calgary Flood and Christchurch most recent
- “kiwi message” learn from us!!
What We have Done

DFPS
HUSAR
Seismic Upgrades (bridges/structures)
Non-seismic retrofitting of City Buildings
Consolidated radio & dispatch (E-Comm)
Emergency Supply Containers
Public Preparedness Education
Emergency Operations Centre
Disaster Response Routes
Building code improvements
Pet Programs

Earthquake Strategy

Earthquake Strategy: 56 Actions Over 5 years

12 Primary Actions + 44 Supporting Actions

Increased efforts to REDUCE RISK lead to faster RECOVERY
Impacted System: Private Buildings - Overview

Large pre-1973 seismic code buildings

Earthquake Strategy - Private Buildings - Further Work

<table>
<thead>
<tr>
<th>Risk Reduction Actions</th>
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<tbody>
<tr>
<td>39. Establish a technical committee to advise City on high-risk building abatement options</td>
</tr>
<tr>
<td>40. Establish consistency in the application of seismic upgrade requirements for existing buildings</td>
</tr>
<tr>
<td>41. Facilitate knowledge transfer of seismic building and retrofit techniques between the scientific, regulatory, and development sectors</td>
</tr>
<tr>
<td>42. Fast-track adoption of seismic provisions in the 2015 National Building Code update</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparedness Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>43. Mandate storage of structural drawings with fire plans to speed-up assessment of complex/high occupancy buildings</td>
</tr>
<tr>
<td>44. Provide tools for residents in single-family homes to self-assess damaged structures</td>
</tr>
<tr>
<td>45. Incorporate minimum of two structural engineers on HUSAR team</td>
</tr>
<tr>
<td>46. Engage private sector Structural Engineers in damage assessment program</td>
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</tbody>
</table>
Assets and Tools: Heavy Urban Search and Rescue

- Multi-purpose team, critical in responding to trapped people in damaged buildings and structures and can support a wide range of other disaster response activities

- 125 trained members, including:
  - Rescue technicians
  - Engineers
  - Paramedics
  - Doctors
  - Search dogs

- Simulated earthquake site for training

- Lost Federal funding, now supported by City and Provincial funding

Assets and Tools: Vancouver Volunteer Corps

- Christchurch demonstrated importance of trained volunteer response

- Vancouver Volunteer Corps (VVC) launched in 2012. Over 800 members, comprised of:
  - 300 general VVC members
  - 400 Emergency Social Services volunteers
  - 100 Neighbourhood Emergency Assistance Team (NEAT) volunteers

- 150 VECTOR emergency communications volunteers

- Annual exercises and drills
Disaster Response and Recovery Timeline

Preparedness
Risk Reduction
Risk Assessment

EARTHQUAKE INITIAL RESPONSE GUIDELINE (IRG)

- City Field Staff respond to Disaster Staging Areas (DSAs)
- Mayor, Corporate Management Team, and EOC staff proceed to Emergency Operations Centre (EOC)
- HUSAR conducts initial reconnaissance and begins rescue efforts
- Vancouver Fire and BCAS respond to fires and critical medical calls
- Vancouver Volunteer Corps (VVC) support response activities
- Reception Centres are established
- Emergency Shelters are set-up
- Emergency repair to critical utilities begins
- Some residents in damaged homes setup tents in their yards, others stay with friends and family. Some seek assistance from the government and NGOs.

Response

- Buildings and infrastructure are damaged
- Gas lines rupture - fires start
- Power goes out
- 9-1-1 is overloaded
- Phone system overloaded
- People flood to the streets and begin making their way from the areas of major damage

Recovery

- Building damage assessments
- Medium-term and long-term housing
- Redevelopment planning of heavily damaged areas
- Rebuilding of critical utilities (water, sewer, power, telecommunications)
- Some businesses look for temporary alternate facilities, others seek permanent alternate facilities
Developing your Family Emergency Plan

1. Identify the Hazards
2. Family Meeting Place
3. Out of Area contact
4. Emergency Kits
5. Food & Water
6. Home Preparedness
7. Utilities and Fire Prevention
8. Kids, People with Disabilities & Seniors
9. Pets & Disasters
10. Practice your Plan

#4 - Emergency Kits

1. Grab and Go Kits
2. Home Kits
3. Car Kits
4. School Kits
5. Work Kits
6. First Aid Kits
#9 - Pets and Disasters

- Prepare a grab and go kit for each pet
  - Food
  - Water
  - Leash
  - Blanket
  - Toys
  - Vaccination Certificates
  - Kitty Litter
  - Plastic Bags
  - Newspaper
  - Bowls
  - Registration

Current State

- Regional and City Framework
- Lack of Broad plan on Engineers role
- Interim Plan - getting better
- What happens now........
Role of Structural Engineers

- Specialised Advice
  - Fire - Rescue
  - HUSAR
  - CBO
- High Priority Buildings
- Detailed Inspections
  - Plans of Buildings
- Building Fall Zones
- Uncertain cases
- Recovery Issues

Surveyors - the new responder.....

- Crucial to monitor Buildings
- Determine lean / movement
- Monitor rescue / inspections
Clear Cases

- ATC 20/45
- Clear Cases Easy
- But
  - Other issues
  - Rescues
  - Stabilisation

Serious Damage

Damage can be hidden
Incident Response Engineer Support

- Combined Command Response
- Team developed to Respond
- Engineers key role

Fall Hazards

- Damage to Building
- Consequence of Failure
- Fall Zone and Direction
- Compounding Impacts
Consequences of Inspections

- Red Card
  - 200-300 Families in one Building
  - Fall Zones
- Group Lodging
- Exponential Impacts
- Insurance
- Mandatory Demo Issues
  - Training and Consistency
  - Records
  - Multiple Inspections

ESS

- Use Community Centres
Local / Provincial State of Emergency

- 9 Powers
- Order from Mayor
- Likely to be declared early
- Province can declare and / or over-rule

Emergency Act and VBBL

- VBBL - new version Jan 1, 2015
- Powers of Entry VBBL - Book 1, Division C, 1.5.2
  - “any person authorized to act for CBD”
- Authority Regarding Unsafe Conditions - Division C, 1.5.3
  - Ability to act on unsafe conditions, corrective measures, immediate measures and use, occupancy etc.
- Delivery of Order - Division c, 1.5.4.6
  - May post order - see ATC Placards
BCERMS: BC Emergency Response Management System

BCERMS Response Goals

1. Provide for Safety & Health of all Responders
2. Save Lives
3. Reduce Suffering
4. Protect Public Health
5. Protect Government Infrastructure / Critical Infrastructure
6. Protect Property
7. Protect the Environment
8. Reduce Economic & Social Losses

BCERMS & Incident Command System

• Unity of command
• Common terminology
• Management by objective
• Flexible and modular organization
• Span of control
**BCERMS: BC Emergency Response Management System**

- Based on Incident Command System (ICS) - used throughout North America

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**Emergency Operations Centre (EOC)**

- Inter-agency coordination
- Information sharing
- Coordinated planning
- Resource support
- Integrated communication
- Post-disaster facility
Disaster Response Framework for the City of Vancouver

EOC staff and senior management will report directly to the EOC to provide strategic direction and support to the DSAs

Emergency Operations Centre (EOC)

Departmental Operations Centres (DOC)

DSA 1
Nelson Park

DSA 2
Clinton Park

DSA 3
Beaconsfield Park

DSA 4
Gordon Park

DSA 5
Oak Park

DSA 6
Connaught Park

Pre-identified staff from ENG, Parks, CSG, VFRS, and VPD will report to the DSA closest to them, establish communication with the EOC and begin assessing local damage and prioritizing debris clearance.

Incident Command Structure
What could happen if a moderate to severe earthquake strikes Vancouver?

- Damage to roads and bridges will limit travel to and within the city
- Cell phone networks will be overloaded and communications will be limited
- Power could be out for several days or weeks
- Critical facilities and buildings will be damaged (including hospitals, schools, community centres)
- Water and sewer infrastructure will be impacted
- Hundreds of people could be injured, killed, or displaced

What to Expect

- Organized Chaos
- Spontaneous Rescues and Help
- Typical First Responders
- Construction Community
- Engineers
- Volunteers
Volunteer Rescues

Construction Industry

- Equipment and Resources
- Applicable Skills
- Always crews available
Medical Help

Compounding Impacts

- Liquefaction & Water Main Breaks
- Damaged Storm Sewers
- River Narrowing and Silting
- Potential High Tides
Slope Stability -

Maine Drive  Arbutus Ridge  Railway Cut  UBC
Geological Assessment Required

Disaster Staging Area Orientation for Field Staff
Disaster Staging Areas (DSAs)

- 6 containers located across the City, 1 in each zone (see map)
- Containers are filled with emergency response supplies, including communications tools, damage assessment kits, and response instructions
- The purpose of DSAs are to support the re-establishment of Command, Control and Coordination immediately following a moderate to severe earthquake

How do I know if I’ve experienced a moderate earthquake?

A moderate earthquake is one which is felt indoors by most people (you may feel a sensation like a heavy truck striking the building), and outdoors by some. Most suspended objects sway, stationary vehicles rock steadily or move, windows and dishes rattle alarmingly, and walls make cracking sounds.
Immediately after the earthquake

*Page 1 of the EQ Vehicle Guide*

Drop, Cover, and Hold on - protect your head!

Follow the instructions in the EQ vehicle guide (to be located in all vehicles):

- Anticipate aftershocks and assess your surroundings
- Try to contact your family - you will be better able to respond if you know they are safe
- Attend to your team’s immediate first aid and self-rescue needs
- Turn on your department/agency radio if you have one.
- Make your worksite safe
- Go to the nearest DSA
On your way to the DSA:
Earthquake Impact Assessment

• Take note of damage while you are travelling to the DSA
• Report this damage to the Unified Command at the DSA (ie: person in charge wearing green vest)
• Unified command will prioritize response based on the information you collect

Arriving at a Disaster Staging Area

• If you are the first one there, wait for another person to arrive and send a runner to the nearest fire hall to get the key
• There are instructions at the DSA to help you set up the area
• Sign in and record the time of your arrival
• The most senior staff from ENG, VPD, VFRS, & CSG will establish ‘Unified Command’
Disaster Response Framework for the City of Vancouver

EOC staff and senior management will report directly to the EOC to provide strategic direction and support to the DSAs.

Pre-identified staff from ENG, Parks, CSG, VFRS, and VPD will report to the DSA closest to them, establish communication with the EOC and begin assessing local damage and prioritizing debris clearance.
• Command determines the tasks the DSA staff will complete
• Staff are then assigned roles based on the skill-sets
• It is critical to first understand the tasks to be accomplished as per the DSA Priorities
• The Org Chart reflects these priorities

DSA expanded Command

• With more resources, the DSA can expand
• Additional roles support Operations activities
1. Windshield damage assessment
   - Driving mapped out routes to quickly identify blockages or damage to main arteries, and assess access / damage to critical infrastructure. This assessment is done from your vehicle.

2. Rapid building damage assessment
   - Building inspectors and other trained staff will go directly to critical facilities to assess damage and report back.

3. Street / debris clearing
   - Some staff will be assigned to begin clearing debris to open up key access routes and to support first responders.

4. Other tasks as identified by unified command
   - You may be assigned to other tasks and roles to support the operations of the Disaster Staging Area.

There are checklists and instructions at the DSA to help guide you through each of these roles.
Inspection Priorities

- Life safety (Hospitals, Police, Fire Halls, Ambulance Stations, Operations Centres, Community Centres - ESS, Extended Care)
- Buildings as identified for other uses - eg Shelter, EOC etc.
- Resource needs (food, supplies, equipment etc ) and .................

- Fall Hazards and Impact Area (older high rises, damaged high rises etc.)
- Lists and Maps being developed.................................

What if I’m at home / not on duty?

- The general instruction to most staff is to plan on staying at home and listen to the radio for further instructions. If you hear none, come in for your next shift.

- However, some departments have specific plans that should supersede this general instruction.
What if I can’t contact my family - can I go home?

- If you perform a critical response role (this includes the field staff targeted with this orientation), we expect that you will have family plans in place to maximize your ability to stay at work and support the response. We offer free personal/family preparedness training through the Office of Emergency Management.
- We are also working on plans to incorporate a family-reunification mechanism through 3-1-1 to help families and staff reconnect.
- However, if you must leave work it is imperative that you request this from the DSA commanders or from your supervisor before doing so. If you do not, you may be considered missing which will tie-up response resources.

What if I can’t contact my family - can I go home?

- If you do not perform a critical response role, the expectation is that department plans will be followed.
- The general guideline is to dismiss non-essential staff after they have checked-in with their supervisor and been accounted for, but this will be dependent on the magnitude of the earthquake, damage, time of day, and other factors or considerations identified at the time.

The key things to remember are to check-in with your supervisor and follow his or her directions. If you do not check-in with your supervisor, you may tie-up response resources as they search for you.
Summary

• You have a critical role to play in helping the City and residents recover from a major earthquake
• If you feel an earthquake report to the DSA that is closest to your current location and report to the most senior person there
• Make a family preparedness plan - call 3-1-1 to register for a NEPP course to learn how

Business Lessons (Business Continuity)

• Need to consider your Business
• Well designed and well built buildings
• Relationship with staff, suppliers,
• Back Ups
• Available cash or credit
“It is a fine line between success and chaos”
John Hare – USAR Engineer and Recovery Principle Building Advisor

But life goes on….

POST-EARTHQUAKE INSPECTIONS
Purpose & Objectives:

- Life Safety
- Initiate Safety Measures (e.g. disconnect power)
- Identify Risk to nearby facilities/buildings
- Status/Usability of Critical Infrastructure
  - E.g. EOC, RC, GL, Fire Halls
- Reduce Demand on Critical Resources (ESS Lodging)
- Business Continuity; to resume operations
- Situational Awareness
Housing Damage Assessment Often Informs:

- Life safety requirements (fire, electrical, gas, health)
- Emergency Lodging requirements
- Psycho-social needs
- Financial position of property owners
- Financial position of residents/occupants
- Business Continuity Initiatives
- Valuation of property (Tax purposes)
- Re-construction permit planning
- NGO Assistance

Implementation History (BC)

- Firestorm (2003)
- Terrace and Nanaimo (2007)
- Chilliwack, Duncan, Smithers (2009)
- Bella Coola (2010)
- Columbia Shuswap, Haida Gwaii (2012)
- IPDAI (2008)

Process Utilized in:
- USA, Japan, New Zealand, Italy…
Two Types of Damage Assessment

1) Immediate Life Safety
   • Windshield & Rapid

2) Loss Estimation & Repair/Demolition
   • Detailed and Engineering

The Scope of Damage Assessment

Damage Assessment Categories:
- Buildings
- Financial/Economic
- Transportation Infrastructure
- Critical Infrastructure Services
- Utilities
- Environmental
- Complex Structures (e.g. Hospitals, Power Generation facilities)
Damage Assessment Timeline

Disaster

Windshield

Rapid

Detailed

Engineer

0  Day 1  Day 2  Day 3

RAPID DAMAGE ASSESSMENT (RDA)
INFORMATION FLOW

Buildings

Life Safety for occupants

RDA Reports

Postings (Placards)

Emergency Operations Centre (Response)

Situational Awareness

Needs assessment

Resilience (Recovery) Centre

Disaster

Financial Assistance
### Damage Assessment Organizations - Conceptual

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Windshield</th>
<th>Rapid</th>
<th>Detailed</th>
<th>Engineering</th>
</tr>
</thead>
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<tr>
<td>British Columbia</td>
<td>Taxi/Bus companies</td>
<td>Shared Services BC</td>
<td>Architectural Institute of BC</td>
<td>Association of Professional Engineers and Geoscientists of BC</td>
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<td>Aerial Photo Organizations</td>
<td>BC Housing</td>
<td>Applied Science Technologists &amp; Technicians of BC</td>
<td>Structural Engineering Association of BC</td>
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<td>News Media</td>
<td>BC Hydro</td>
<td>Municipal Building inspectors</td>
<td>Ministry of Transportation and Infrastructure</td>
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<td>Crowd Sourcing</td>
<td>BC Assessment Authority</td>
<td>BC Safety Authority</td>
<td>Institute of Real Estate Management</td>
<td>Canadian Assoc. of Home and Property Inspectors (BC)</td>
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<td>Building Owners and Managers Association</td>
<td>Building Officials Association of BC</td>
<td>Professional Association of Managing Agents</td>
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<tr>
<td></td>
<td>Rental Owners and Managers Society of BC</td>
<td></td>
<td>Fire Safety Personnel</td>
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<tr>
<td>Canada</td>
<td>Civil Air Search and Rescue Association</td>
<td>Building Inspectors</td>
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<td>Public Works and Government Services Canada</td>
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<td>Royal Architectural Institute of Canada</td>
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<td>Canadian Assoc. of Home and Property Inspectors (Canada)</td>
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</tbody>
</table>
DETAILED INSPECTIONS

Post Disaster Detailed Assessments of Buildings

Presented by
Doug Smith, P.Eng.
Assistant Director - Sustainability
City of Vancouver
Experience

1995 CAN-TF1 HUSAR Structural Specialist
1999 JiJi Earthquake in Taiwan
2001 9-11 Attack in New York City
2001 Nisqually Earthquake in Seattle
2005 Hurricane Katrina in New Orleans
2012 Landslide at Johnson’s Landing
2013 Floods in Calgary

Agenda

1. Definition of Detailed Assessment
2. Personal Safety on Site
3. Inspection Considerations
4. Documentation and reporting
A closer inspection, usually following a Rapid Damage Assessment
- May take several hours
- Essential facilities such as schools, community centres, hospitals, and police and fire stations should be given a Detailed Assessment as soon as possible

Can also be done to confirm/change red/yellow tagged buildings, especially if they are important or result in the displacement of many people
- Complex or large buildings that may impact adjacent buildings, i.e. West End towers of Vancouver
- Required where structural stability is not easily identified from a rapid assessment.
Definition of Detailed Assessment

• Unlike the Rapid Assessment, the Detailed Assessment always includes inspecting inside the building

• Detailed Assessments are done by a structural engineer with appropriate experience in the types of structures being inspected

• Your team is not there for first aid or rescue
Personal Safety

- Assessment teams should consist of at least two people, ideally three
- Make safety and assessment decisions as a team
- Be aware of area hazards - animals, people, insects

Personal Safety - Perimeter

- Survey the building exterior before you go in and make sure someone outside knows you are inside
- Check condition of gas meter on exterior and shut off if leak suspected.
- Only enter if you’re confident there is no immediate threat to your safety
- Risk of collapse, fire, hazmat or unstable slopes are No-Go - Assume aftershocks
Personal Safety - Perimeter

- Looks can be deceiving
- Soft Story Collapse
Non-ductile concrete-frame building deformed in an earthquake

You can see the widely spaced reinforcing at the cracked and spalled joints

This frame has lost most of its strength and could collapse in an aftershock

Personal Safety - Perimeter

Liquefaction and aftershock risk

Even Safe Buildings can have perimeter hazards
Personal Safety - Perimeter

- Aftershock Risk
- Be aware of your surroundings

Personal Safety - Interior

- Ensure adequate emergency exit and consider a secondary exit.

- When you are inside, look out for hazardous materials.

- Also watch for falling objects, fire hazards, electrical hazards, and gas leak
Personal Safety - Common HazMat Causes

- Building structural failures
- Dislodged asbestos
- Underground pipeline breaks
- Elephant’s foot buckling of vertical cylindrical tanks
- Overturning of elevated tanks
- Sloshing from open-topped tanks
- Falling containers
- Equipment sliding or overturning

- Chemistry lab after an earthquake.
- Bottled materials themselves may be hazardous
- If they mix together on the floor, the new compounds formed may create a new set of hazards.
Personal Safety - Security

- Access to buildings
- Interactions with people
- Food, water, hygiene
- Critical Incident Stress

Detailed Assessment Considerations
Assessment Form
Detailed Assessment Considerations
Assessment Form

[Diagram of the ATC-20 Detailed Evaluation Safety Assessment Form]

Detailed Assessment Considerations
Assessment Form

[Diagram of the evaluation form with checkboxes for various hazards and conditions]

CITY OF VANCOUVER
Detailed Assessment Considerations
Assessment Form

ATC-20 Detailed Evaluation Safety Assessment Form Page 2

Building name: [ ]

Sketch (optional)
Provide a sketch of the building or damaged portions. Indicate damage parts.

Estimated Building Damage
If requested by the jurisdiction, estimate building damage repair cost = replacement cost, excluding current.

- [ ] None
- [ ] 0-1%
- [ ] 1-10%
- [ ] 10-30%
- [ ] 30-50%
- [ ] 50-100%
- [ ] 100%

Inspection ID: [ ]

Postin:
If there is an existing postin from a previous evaluation, check the appropriate box.

- [ ] Previous postin
- [ ] INSPEDTED
- [ ] RESTRICTED USE
- [ ] UNSAFE

Inspector ID: [ ]

Date: [ ]

If necessary, revise the postin based on the new evaluation and team judgment. Severe conditions endangering the overall building are grounds for an Unsafe postin. Local Severe and overall Moderate conditions may allow a Restricted Use postin. Indicate the current postin below and at the top of page one.

- [ ] INSPECTED (Green placard)
- [ ] RESTRICTED USE (Yellow placard)
- [ ] UNSAFE (Red placard)

Record any use and entry restrictions exactly as written on placard: [ ]

Further Actions:
Check the boxes below only if further actions are needed.

- [ ] Barricades needed in the following areas:

- [ ] Engineering Evaluation recommended: [ ] Structural [ ] Geotechnical [ ] Other:

- [ ] Other recommendations:

Comments: [ ]

City of Vancouver
Detailed Assessment Considerations

- Non-Structural Damage
- Load path; and is it plumb?
- Progressive Collapse & Aftershocks
- Geotechnical Risks
- Access to Structural Elements
- Adjacent Buildings
- Electricity, Water, Gas and Sewer

Non-structural damage

- Non-structural damage can injure and kill people
- Non-structural can be significant hazard during aftershocks
Detailed Assessment Considerations
Load Path

Unsupported basement walls in Calgary 2013

Detailed Assessment Considerations
Progressive Collapse

Structure supported by doors and damaged columns
Geotechnical Considerations

Consider your surroundings

Access to Structural Elements

Moment Frame under construction
Inspection of Structural Elements

Damaged joint must be exposed to assess

Adjacent Buildings

Large hazard zone

Hazard Zone should be clearly marked
Utilities

Check for utilities

Power, Water or Sewer breaks may mean yellow tag

Gas leaks need to be shut off

Kobe 1995

Documentation and Reporting

• Posted placards must be consistent with your notes
• Post placards in safe areas
• Communicate calmly and clearly with public on site
• Take photos but don’t rely on them
• Report regularly to base
Summary

- Detailed Evaluations are required in special circumstances
- Your personal safety is always the number one priority - Take your time and identify the hazards
- Hazards are not all structural
- Keep good organized notes to document and defend your decisions
Questions/Comments

Thank you

NEXT STEPS
A. APEGBC/SEABC Developing a Roster for Professional Engineers that have:

- Confirmed their personal availability to carry out seismic assessments on buildings in a post earthquake scenario; and
- Confirmed availability with their employer.
B. Insurance/Liability Issue

- COV/APEGBC/Provincial Government working on a process to protect APEGBC professionals willing to carry out post earthquake building assessments.

C. Standard Contracts and Reimbursement

- COV/APEGBC/SEABC are working on addressing both
D. For Engineering assessments APEGBC/SEABC/COV to Develop consistent approach on the level of effort and the standards against which an earthquake damaged building is to be evaluated so it can be occupied.